



## WATER QUALITY

Excellent water quality has been identified as a value to be protected in the planning efforts for the Merced and Tuolumne Wild and Scenic River corridors. Selected indicators of water quality for the draft Tuolumne River Plan are nutrients (total dissolved nitrogen [TDN], nitrate + nitrite [NO<sub>2</sub>NO<sub>3</sub>], total phosphorous [TP] and total dissolved phosphorous [TDP]), *E. coli*, and total petroleum hydrocarbons (TPH). These same water quality indicators are also in development for the Merced River corridor. This report summarizes water quality data collected during Water Year (WY) 2010 (October 1<sup>st</sup>, 2009 to September 30<sup>th</sup>, 2010) and compares these results to draft water quality standards developed from 2004-2007 data (Clow et al., 2011).

### Introduction

The indices of water quality were selected because of their relative responsiveness to human use of areas adjacent to water bodies (Table 1). Nutrients and *E. coli* are produced by natural processes as well, so most sampling is conducted upstream and downstream of heavy use areas in order to detect changes potentially caused by human use. Petroleum hydrocarbons come only from motor vehicles and asphalt and their presence is therefore directly attributable to human use. Draft water quality standards (Table 2) are derived from baseline data collected from 2004 to 2007 (2005-2007 on the Tuolumne River) at each location.

### Findings and Highlights

Table 1 Water Quality: Parameters, Plan/Application, Standards & Observed Condition

Parameter	Plan/Application	Standard	Observed Condition
Nitrate & Nitrite NO <sub>3</sub> NO <sub>2</sub> (mg/l)	Draft Tuolumne River Plan/ In development as a potential indicator for the Merced River corridor	The 75 <sup>th</sup> percentile concentration of a parameter over one water year shall not exceed the standard for a site (at the 95% confidence level) more than 1 in 5 years.	2010 WY samples represent the 75 <sup>th</sup> percentile of data
Total Dissolved Nitrogen TDN (mg/l)	Draft Tuolumne River Plan/ In development as a potential indicator for the Merced River corridor	The 75 <sup>th</sup> percentile concentration of a parameter over one water year shall not exceed the standard for a site (at the 95% confidence level) more than 1 in 5 years.	2010 WY samples represent the 75 <sup>th</sup> percentile of data
Total Dissolved Phosphorous TDP (mg/l)	Draft Tuolumne River Plan/ In development as a potential indicator for the Merced River corridor	The 75 <sup>th</sup> percentile concentration of a parameter over one water year shall not exceed the standard for a site (at the 95% confidence level) more than 1 in 5 years.	2010 WY samples represent the 75 <sup>th</sup> percentile of data



Total Phosphorous TP (mg/l)	Draft Tuolumne River Plan/ In development as a potential indicator for the Merced River corridor	The 75 <sup>th</sup> percentile concentration of a parameter over one water year shall not exceed the standard for a site (at the 95% confidence level) more than 1 in 5 years.	2010 WY samples represent the 75 <sup>th</sup> percentile of data
E. coli (MPN/100ml)	Draft Tuolumne River Plan/ In development as a potential indicator for the Merced River corridor	The 50 <sup>th</sup> percentile concentration of <i>E.coli</i> colonies over one water year shall not exceed the standard (at the 95% confidence level) more than 1 in 5 years.	2010 WY samples represent the 50 <sup>th</sup> percentile of data
Total Petroleum Hydrocarbons TPH (# of exceedances)	Draft Tuolumne River Plan/ In development as a potential indicator for the Merced River corridor	The number of times sample concentration exceeds 14 µg/l shall not exceed more than 20% of the samples collected in more than 1 out of every 5 years.	2010 WY samples resulted in one exceedance at three of the four sites sampled (9%, 9%, &10%)

Table 2 Draft Water Quality Standards for Yosemite National Park by Site

Parameter	Location										
	Merced River				South Fork Merced River		Tuolumne River				
	Below Foresta Bridge	Above Pohono Bridge	Above Happy Isles Bridge	Above Nevada Falls	Above Swinging Bridge	Below Wawona Campground	Lyell Fork above Twin Bridges	Dana Fork below Gaylor Creek	Above Hwy 120 (Tioga Rd Bridge)	Above Budd Creek	Below Conness Creek
NO <sub>3</sub> NO <sub>2</sub> (mg/l)	0.043	0.02	0.032	0.034	0.037	0.017	0.048	0.013	0.064	0.049	0.019
TDN (mg/l)	0.238	0.13	0.128	0.088	0.172	0.143	0.097	0.079	0.096	0.131	0.074
TDP (mg/l)	0.005	0.006	0.003	<0.003	<0.003	0.006	<0.003	<0.003	<0.003	0.003	<0.003
TP (mg/l)	0.012	0.011	0.007	<0.004	0.005	0.009	0.005	<0.004	0.004	0.018	<0.004
<i>E. coli</i> (MPN/100 ml)	5	7	6	n/a	2	4.1	5	4.1	5.2	4.1	*

\* Insufficient data for standard determination as of October 2008.



The 2010 water quality indicator data are summarized by site (Table 3); nutrient values represent the 75<sup>th</sup> percentile of data, *E.coli* represents the 50<sup>th</sup> percentile and TPH values are the number of exceedances of the detection limit. No indices exceeded the standard at the 95% confidence level, though the NO3NO2 value for the Foresta Bridge site was close to exceedance. Sampling for petroleum hydrocarbons revealed one exceedance at three of the four sites sampled in all sampling for the water year.

Table 3 Water Quality Indices by Site for WY 2010 (The top number is the value of the index and the bottom number (in italics) is the number of samples)

Parameter	Location										
	Merced River				South Fork Merced		Tuolumne River				
	Above Foresta Bridge	Above Pohono Bridge	Above Happy Isles Bridge	Above Nevada Falls	Above Swinging Bridge	Below Wawona Campground	Dana Fork Below Gaylor Creek	Lyell Fork Above Twin Bridges	Above Budd Creek	Above Hwy. 120 (Tioga Rd Bridge)	Below Conness Creek
NO3NO2 (mg/l)	0.079	0.018	0.033	0.025	0.02	0.112	0.022	0.07	0.057	0.023	0.012
	11	11	11	5	11	11	4	7	7	4	3
TDN (mg/l)	0.108	0.065	0.072	0.05	0.046	0.06	0.081	0.1	0.01	0.075	0.026
	11	11	11	5	11	11	4	7	7	4	3
TP (mg/l)	0.008	0.005	0.002	0.002	0.004	0.005	0.006	0.002	0.003	0.007	0.002
	11	11	11	5	11	11	4	7	7	4	3
TDP (mg/l)	0.003	0.005	0.002	0.002	0.004	0.004	0.002	0.001	0.001	0.002	0.002
	11	11	11	5	11	11	4	7	7	4	3
<i>E.coli</i> (MPN/100 ml)	21.0	10.0	7.5	n/a	2.0	17.0	10.5	2.6	5.8	2.6	n/a
	11	11	11		11	11	4	4	4	4	
TPH (# of exceedances)	1	1	n/a	n/a	n/a	1	n/a	n/a	0	n/a	n/a
	10	11				11			5		

n/a Indicates data was not collected at the site or there is insufficient data for index determination.

### Conclusion & Future Implications

In WY 2010, water quality in the Merced and Tuolumne Rivers remained excellent; nutrient and *E.coli* concentrations were not significantly different from conditions in 2004-2007 when baseline data were collected.